

Fig. 1A (Prior Art)

SEP 2 4 2002

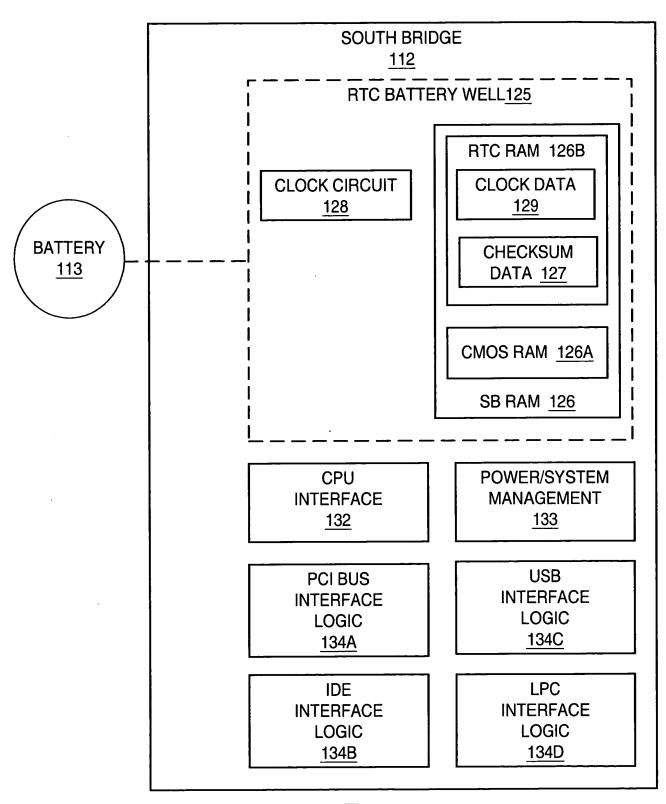


Fig. 1B (Prior Art)

135

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Fig. 2A (Prior Art)



/ 170

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Fig. 2B (Prior Art)

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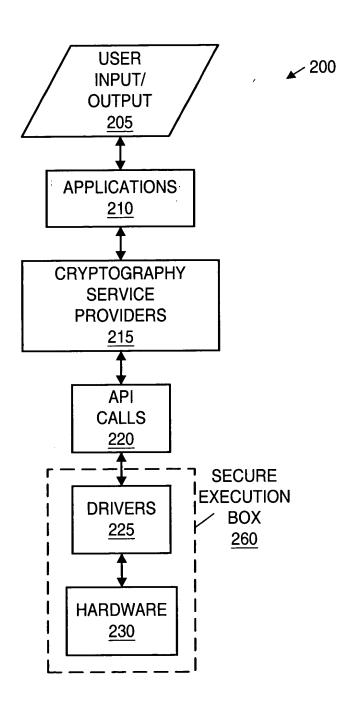
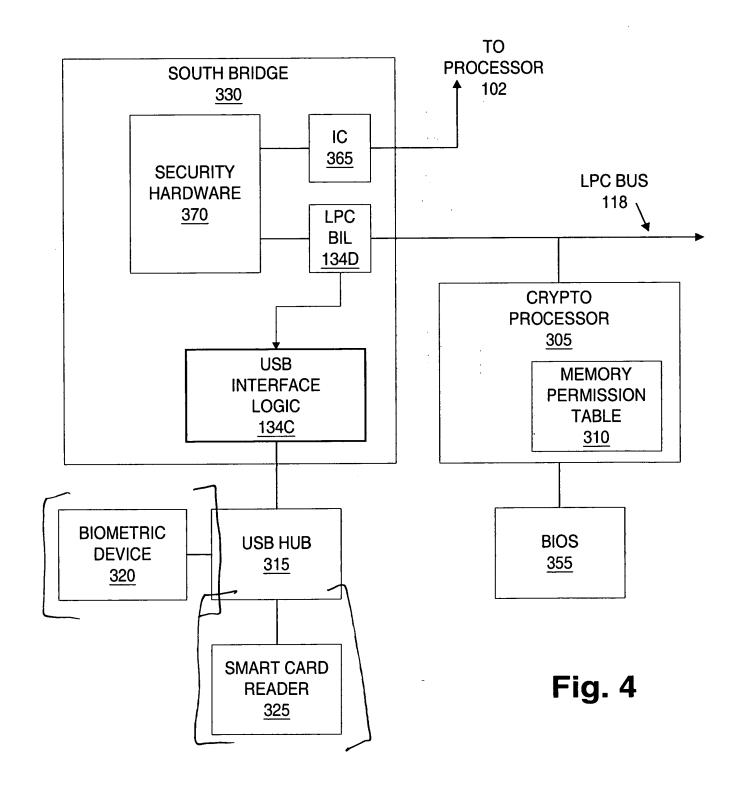


Fig. 3





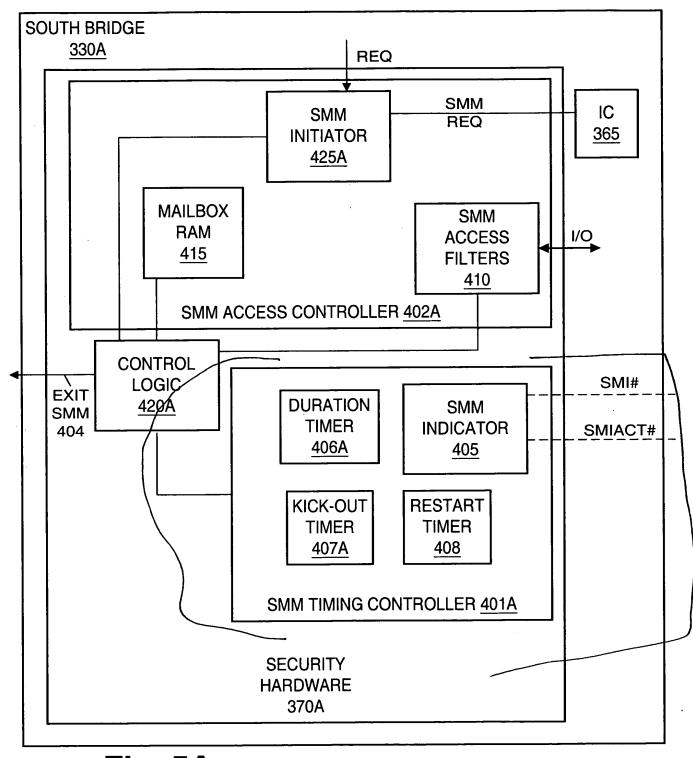


Fig. 5A

Fig. 5B



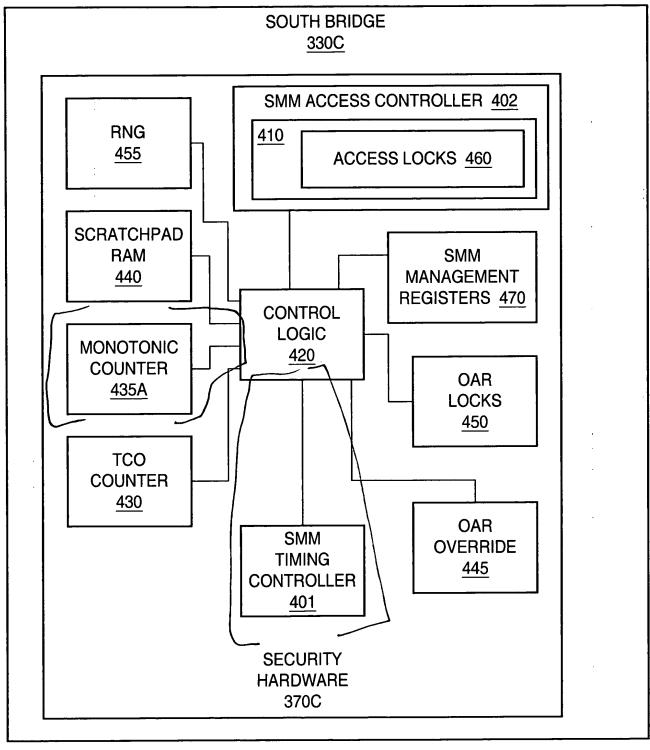
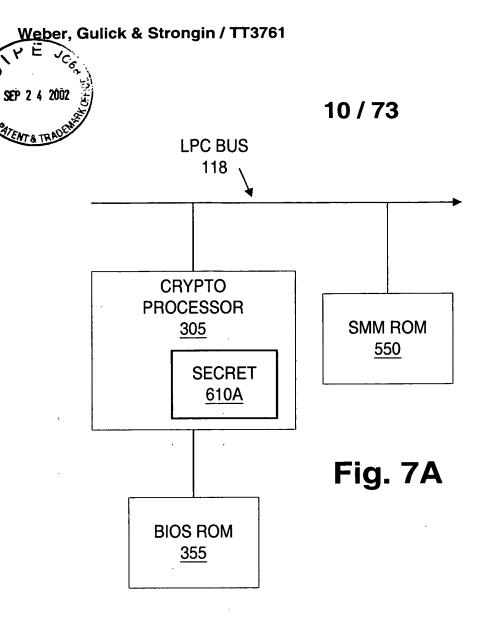


Fig. 6



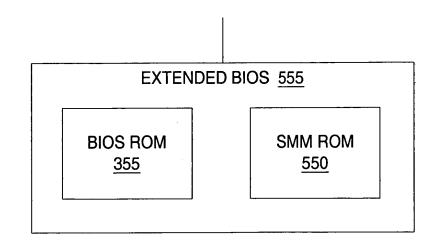


Fig. 7B

Fig. 7C

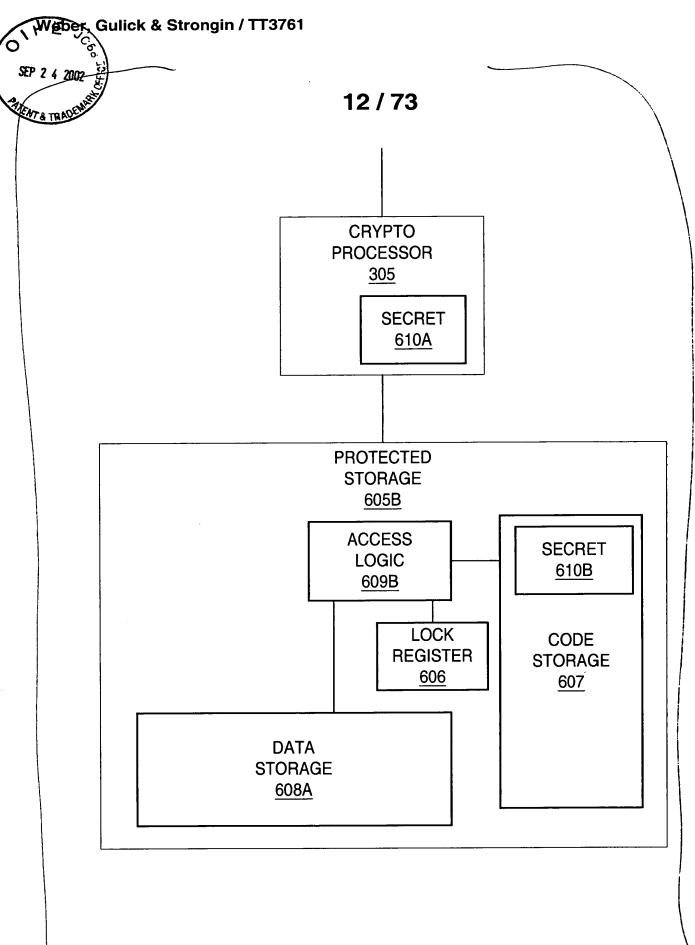


Fig. 7D



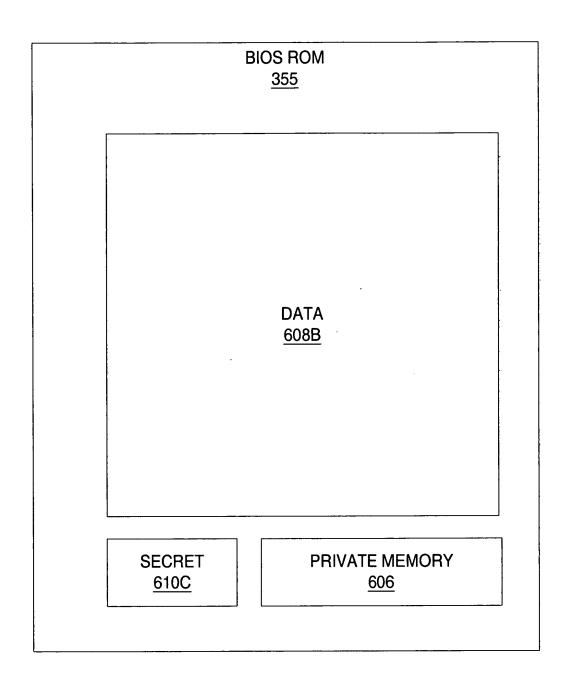


Fig. 8A



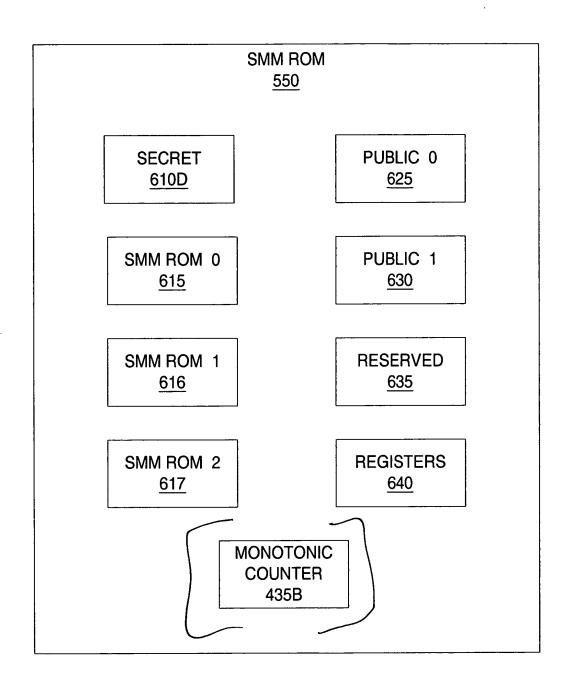
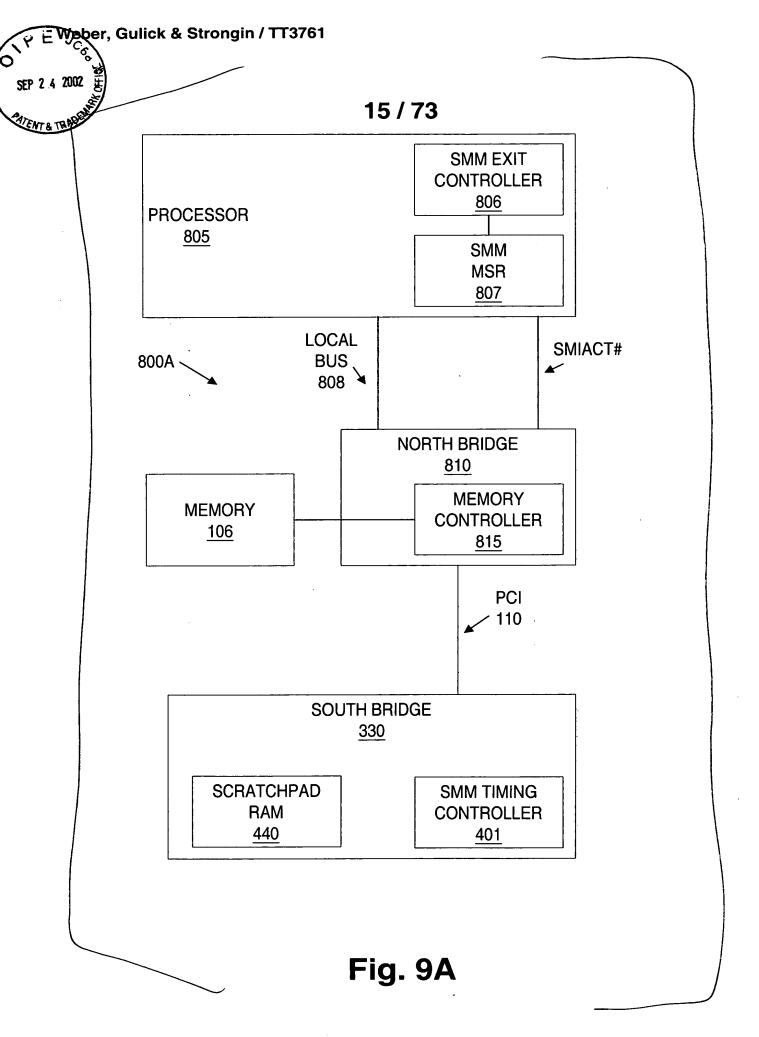
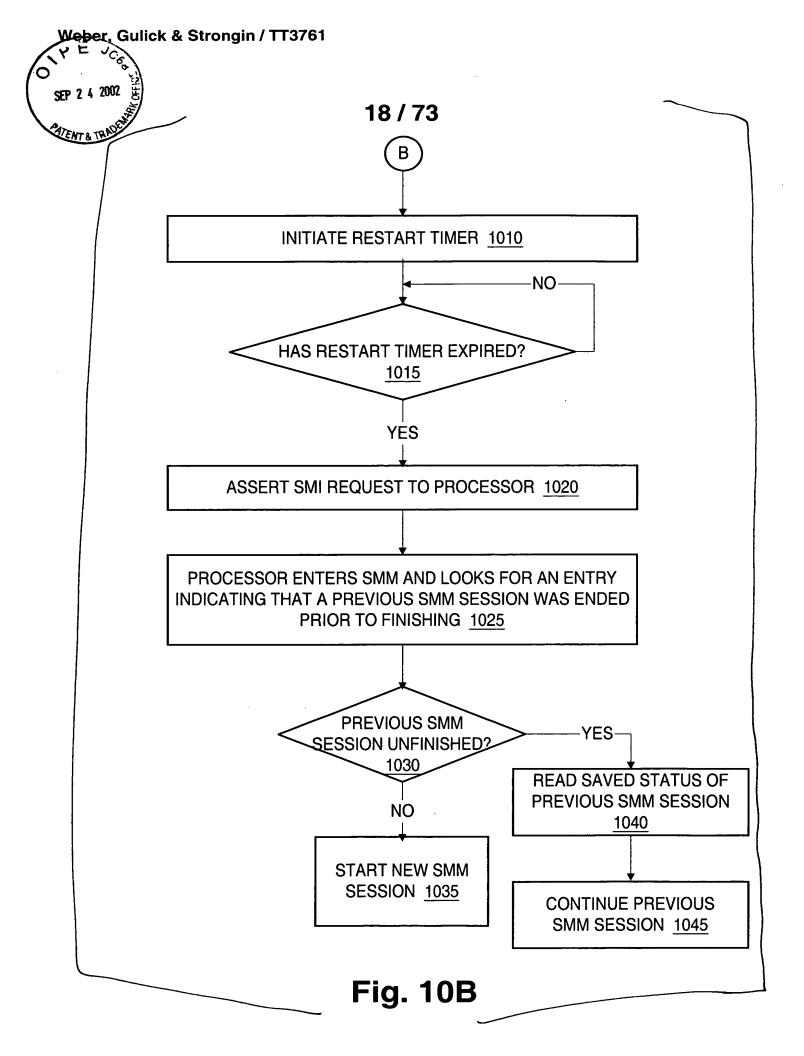
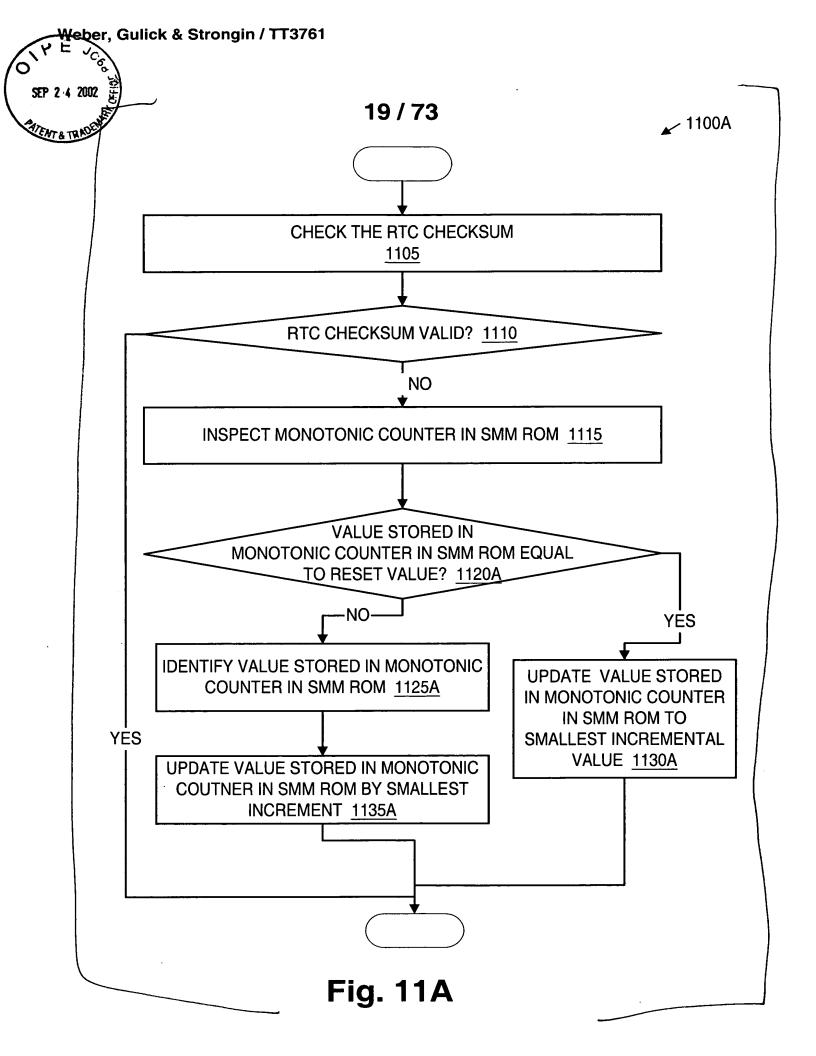
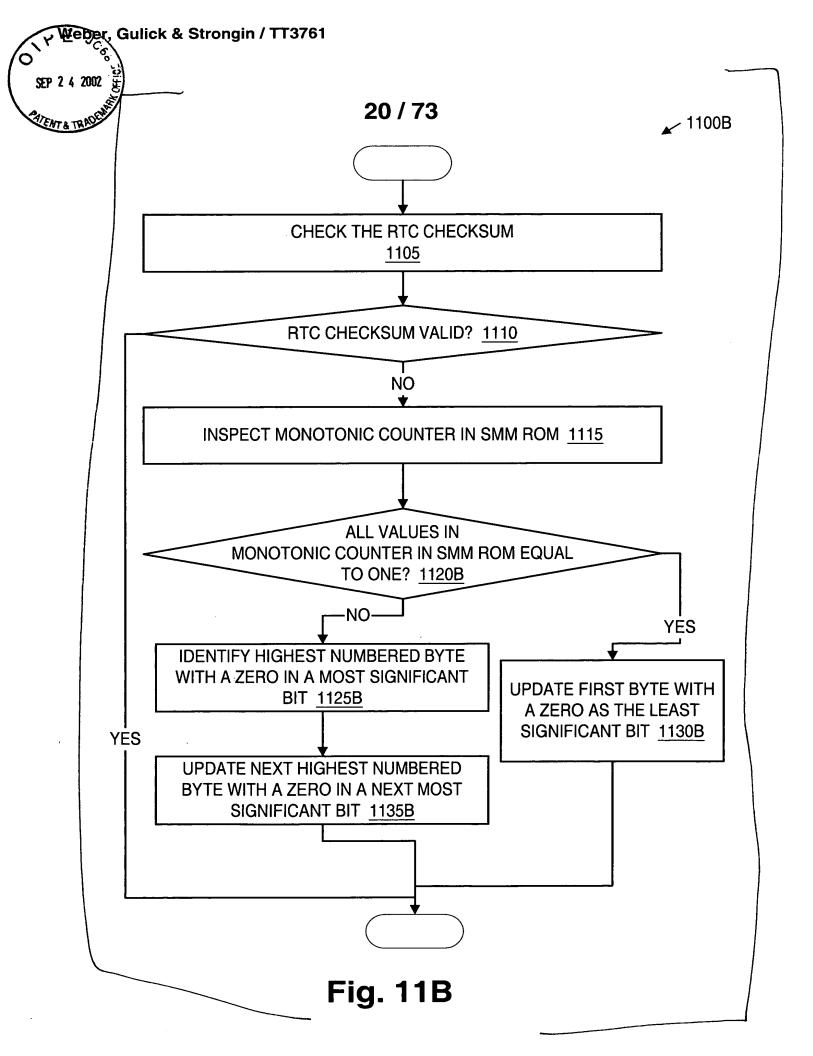


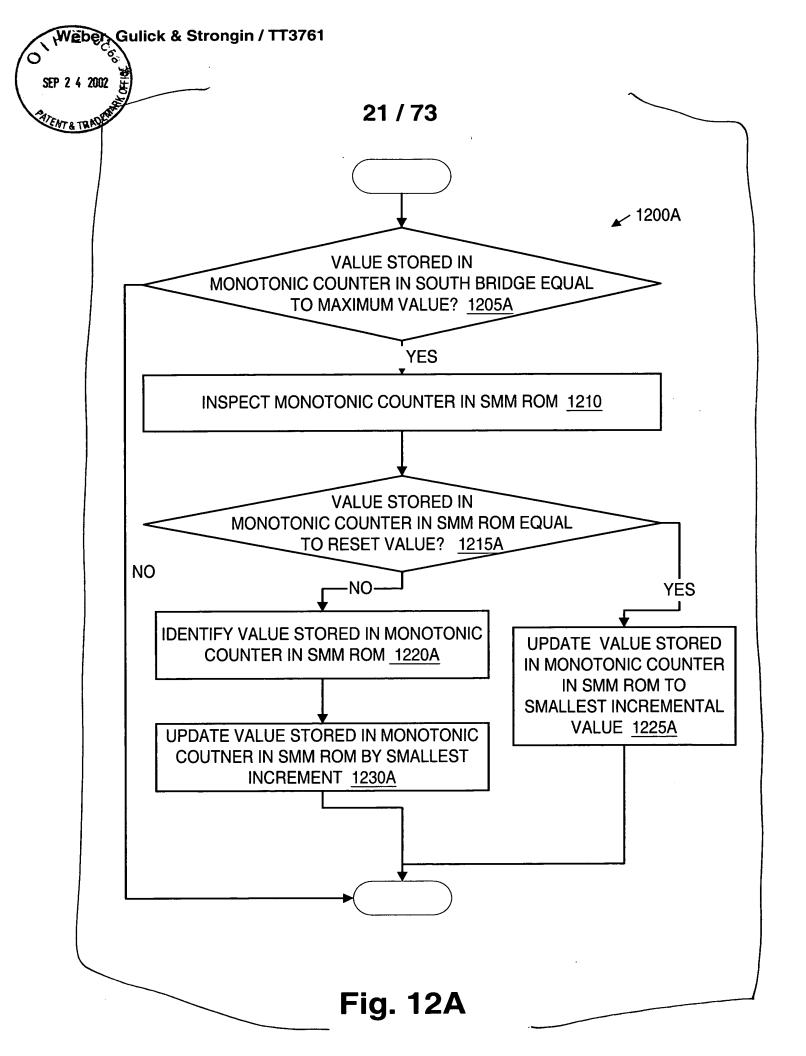
Fig. 8B

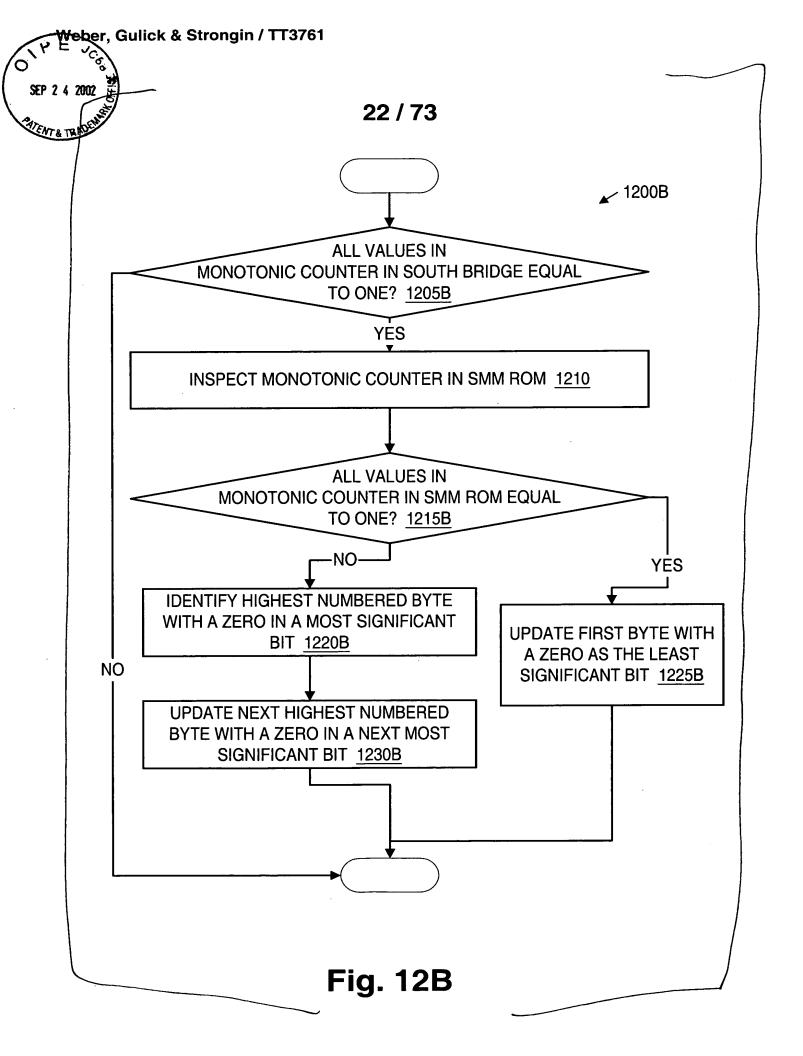














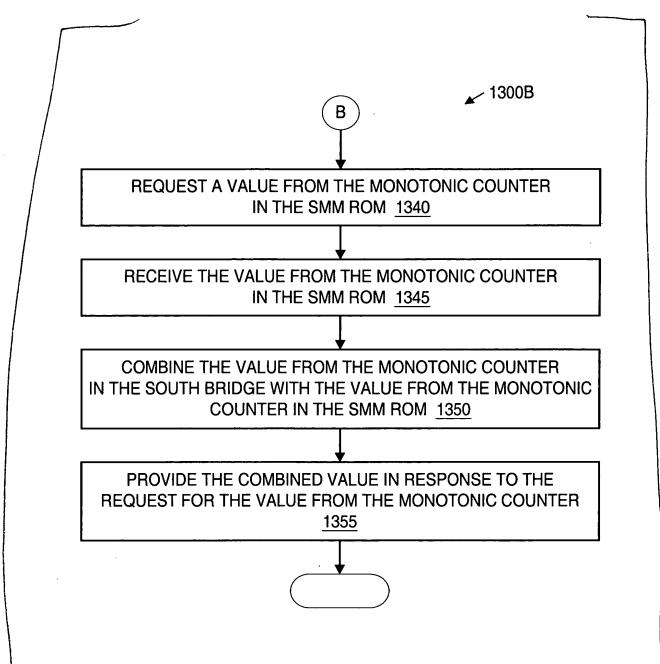


Fig. 13B

Fig. 14B

Fig. 15



THE PROCESSOR EXECUTES BIOS CODE INSTRUCTIONS FROM SMM SPACE IN THE RAM 1620 BIOS CODE PERFORMS POWER ON SELF TEST (POST) 1625 ACCESSING THE SECURITY HARDWARE)1630 OPTIONALLY ENTER BIOS MANAGEMENT MODE 11632 BIOS CODE LOOKS FOR ADDITIONAL BIOS CODE, SUCH AS VIDEO @ C000h AND ATA/IDE HARD DRIVE BIOS CODE @ C800h, AND DISPLAYS A START-UP INFORMATION SCREEN \1635 BIOS CODE PERFORMS ADDITIONAL SYSTEM TESTS, SUCH AS THE RAM COUNT-UP TEST, AND SYSTEM INVENTORY, SUCH AS IDENTIFYING COM AND LPT PORTS)1640 BIOS CODE IDENTIFIES PLUG-N-PLAY AND OTHER SIMILAR DEVICES AND DISPLAYS A SUMMARY SCREEN 1645 CLOSING THE ACCESS LOCKS TO THE SECURITY HARDWARE)1650 BIOS CODE IDENTIFIES THE BOOT LOCATION 1655 BIOS CODE CALLS THE BOOT SECTOR CODE TO BOOT THE COMPUTER SYSTEM 1160

Fig. (16A

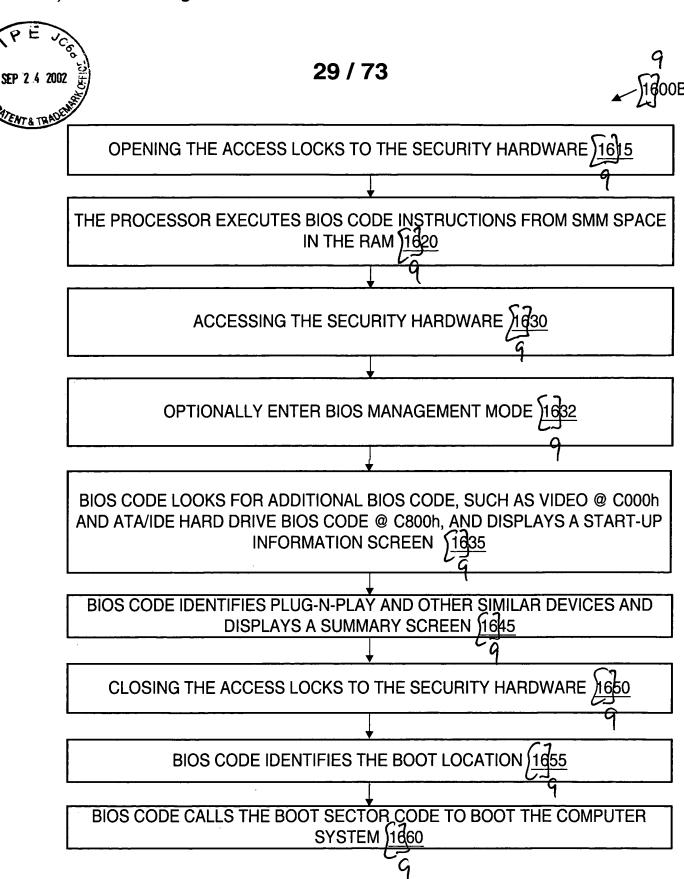


Fig. 16B

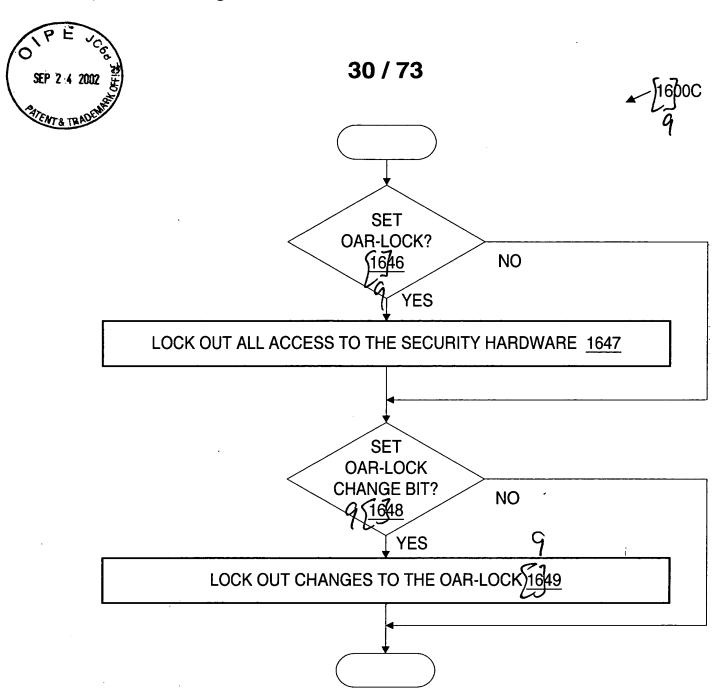


Fig. 16C

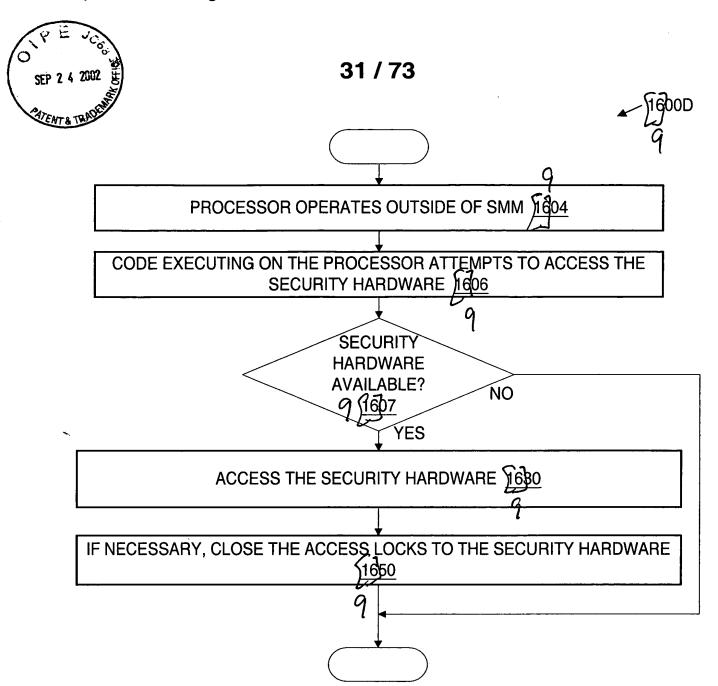
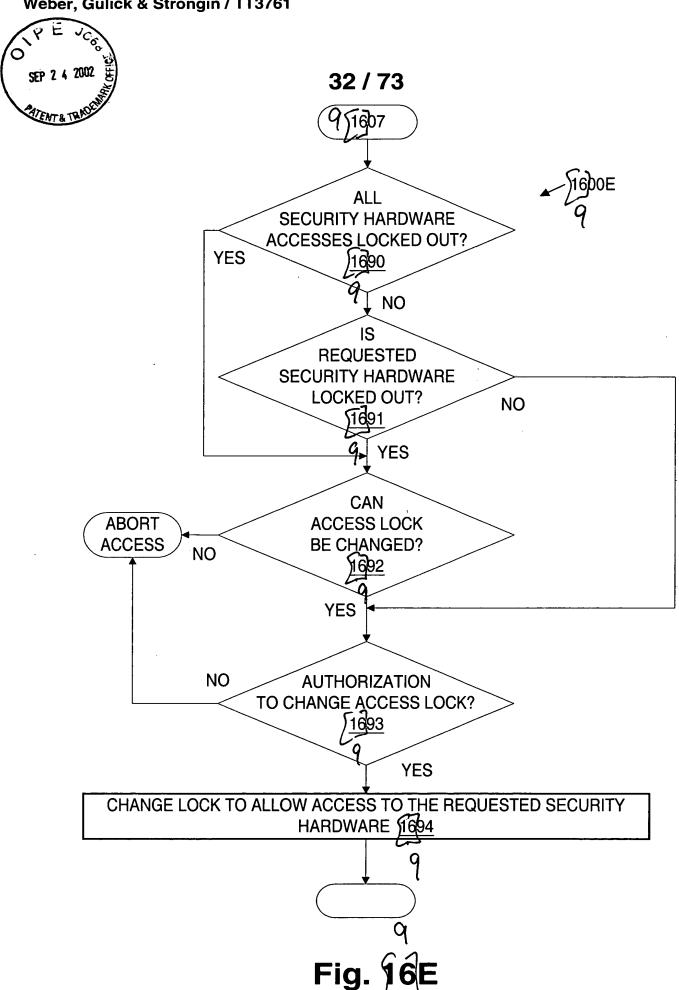


Fig. 16D







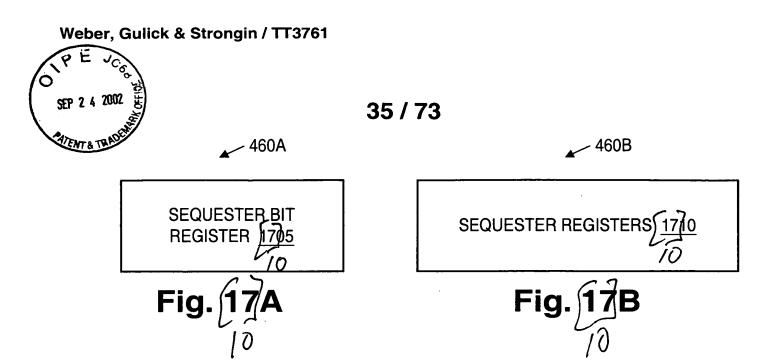
THE PROCESSOR LOADS CODE INSTRUCTIONS INTO SMM SPACE IN THE RAM 1605 OPENING THE ACCESS LOCKS TO THE SECURITY HARDWARE 15 THE PROCESSOR EXECUTES SMM CODE INSTRUCTIONS FROM SMM SPACE IN THE RAM 1620 ACCESSING THE SECURITY HARDWARE 1630 CLOSING THE ACCESS LOCKS TO THE SECURITY HARDWARE \1650 THE PROCESSOR RELOADS THE PREVIOUS STATE AND CONTINUES OPERATING (1665

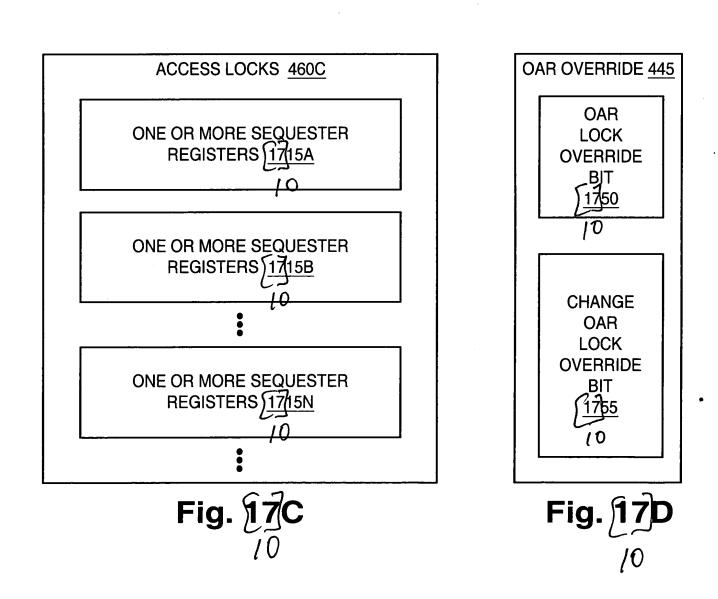
> 9 Fig. 16F

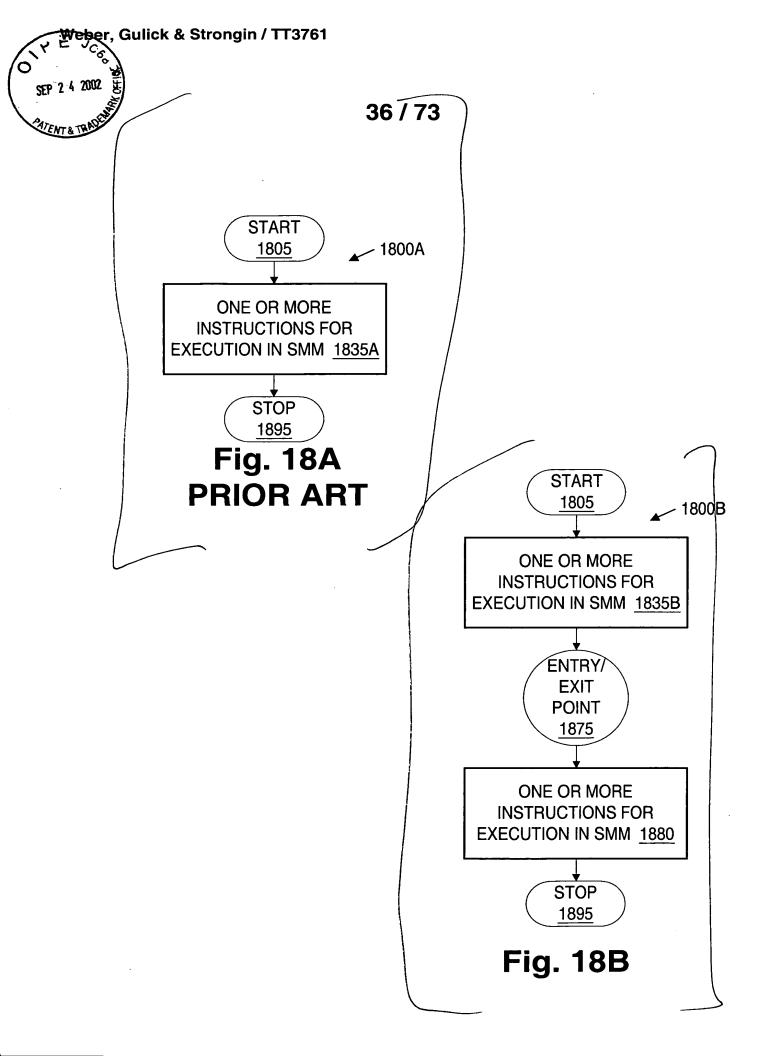


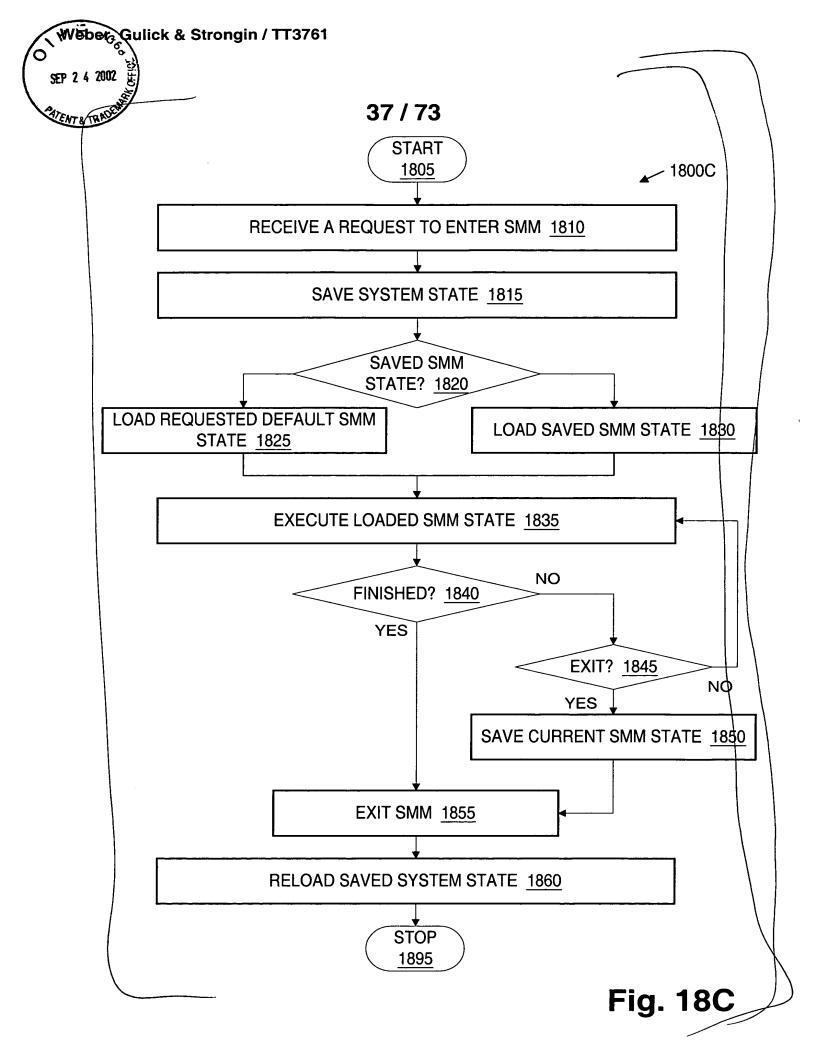
THE PROCESSOR LOADS CODE INSTRUCTIONS INTO SMM SPACE IN THE RAM 1605 SECURITY NO **ABORT HARDWARE** AVAILABLE? **ACCESS** 1607 YES THE PROCESSOR EXECUTES SMM CODE INSTRUCTIONS FROM SMM SPACE IN THE RAM \$620 ACCESSING THE SECURITY HARDWARE 1630 CLOSING THE ACCESS LOCKS TO THE SECURITY HARDWARE 1650 THE PROCESSOR RELOADS THE PREVIOUS STATE AND CONTINUES OPERATING 1665

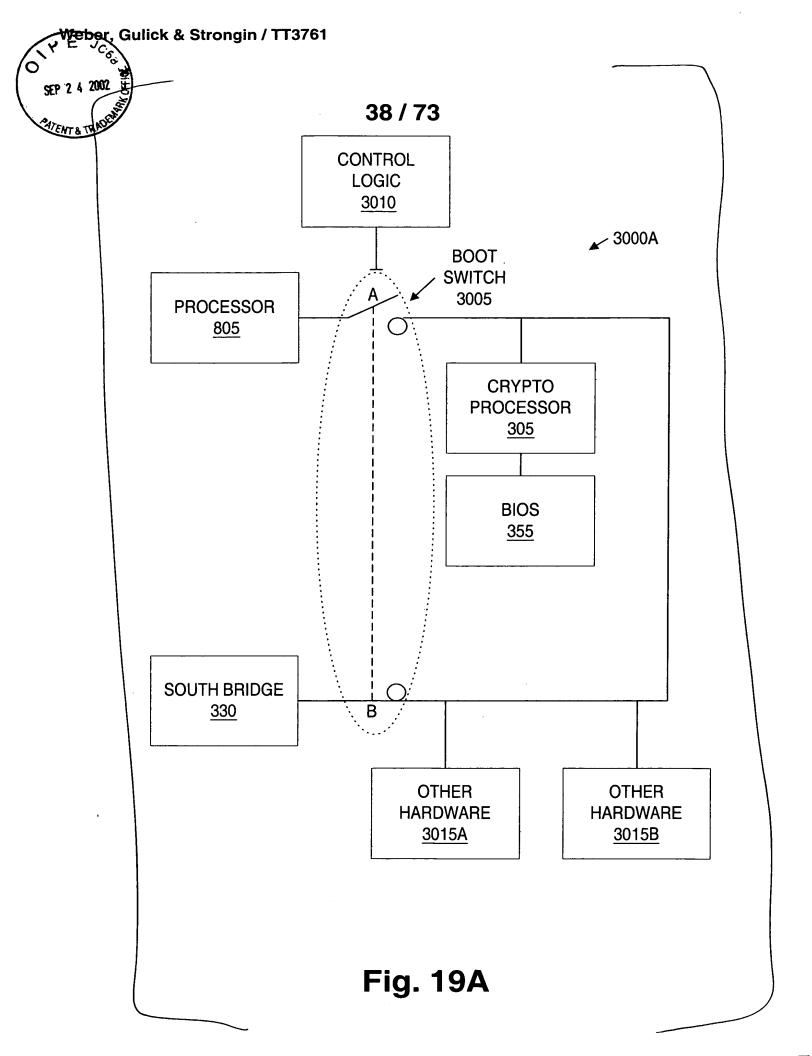
> 9 Fig. 16G











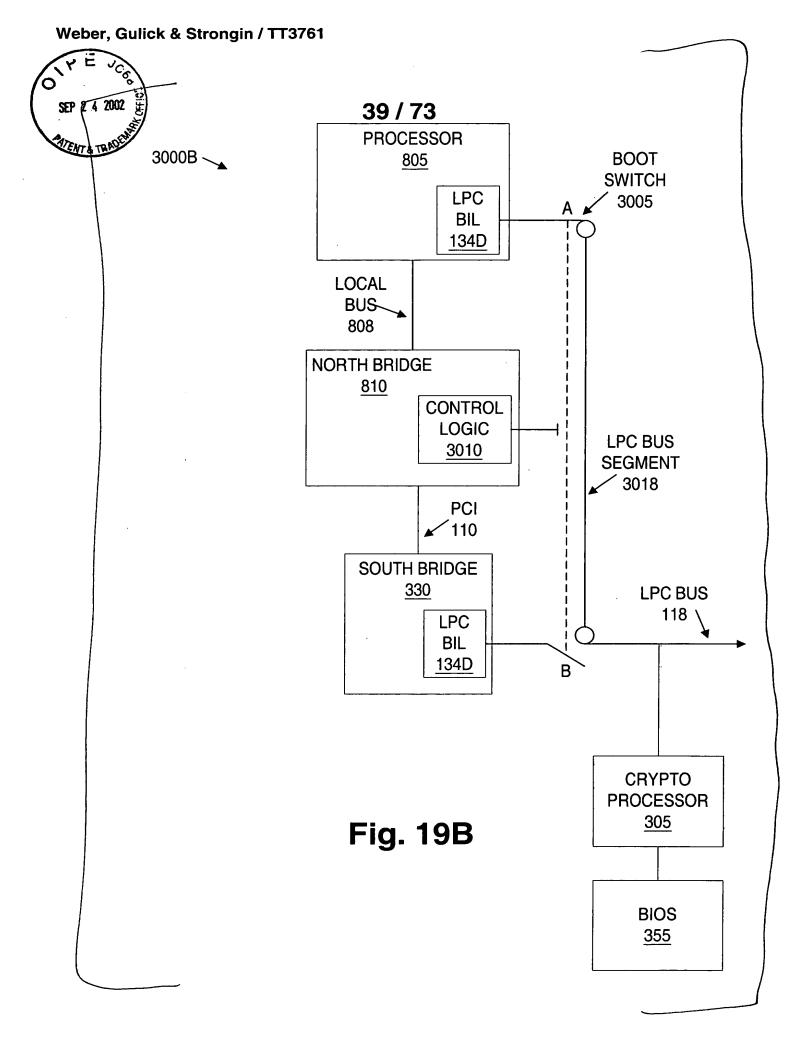
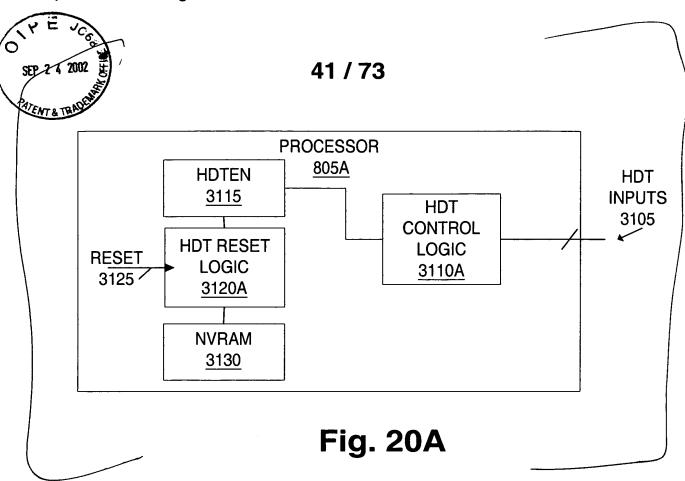
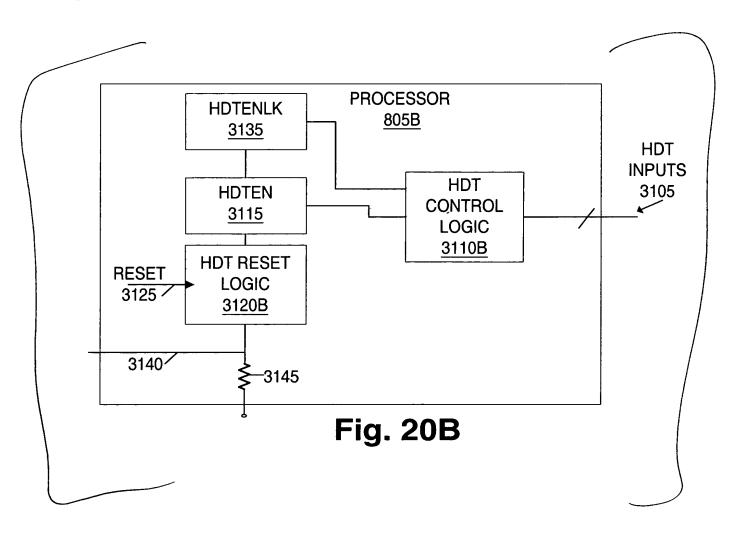
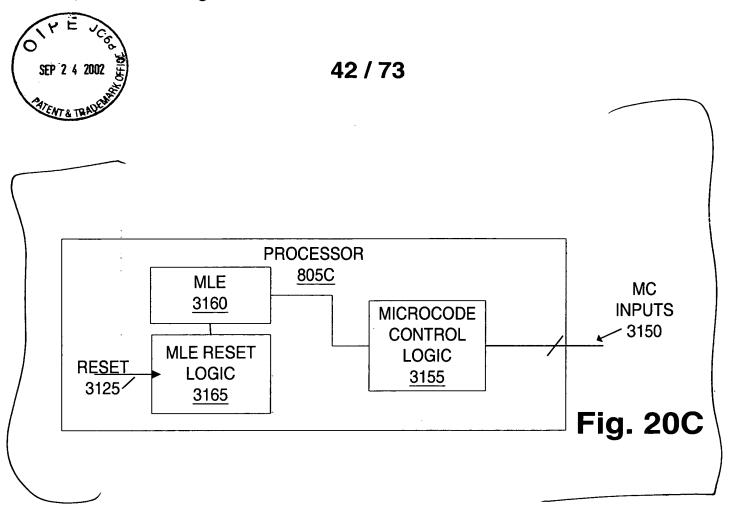
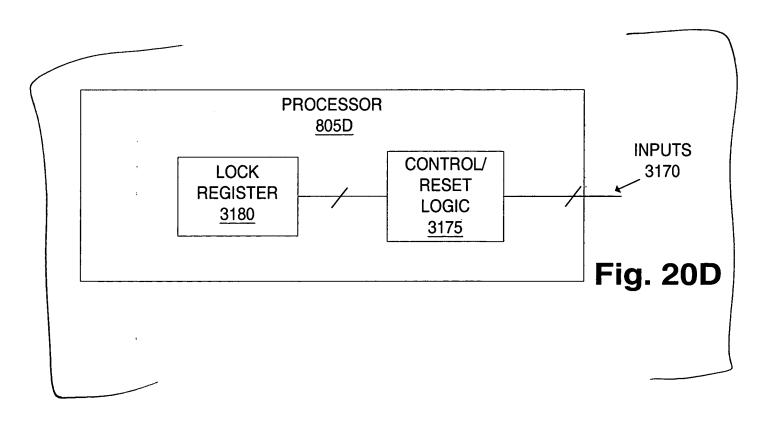


Fig. 19C

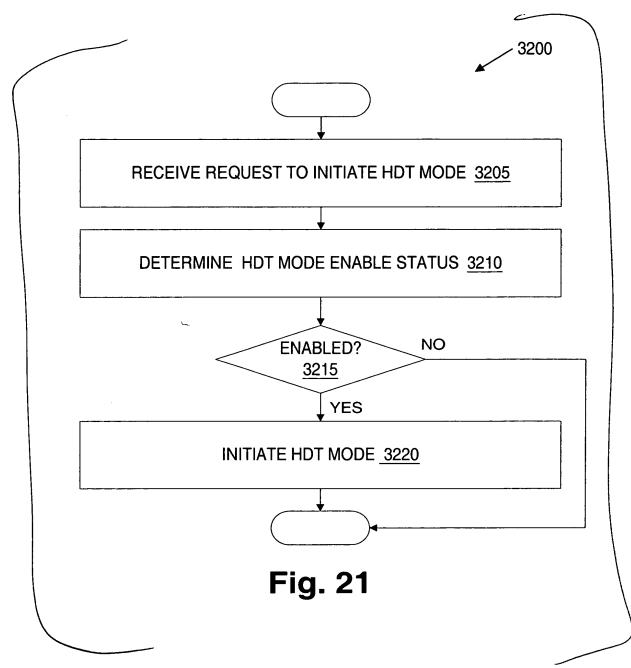


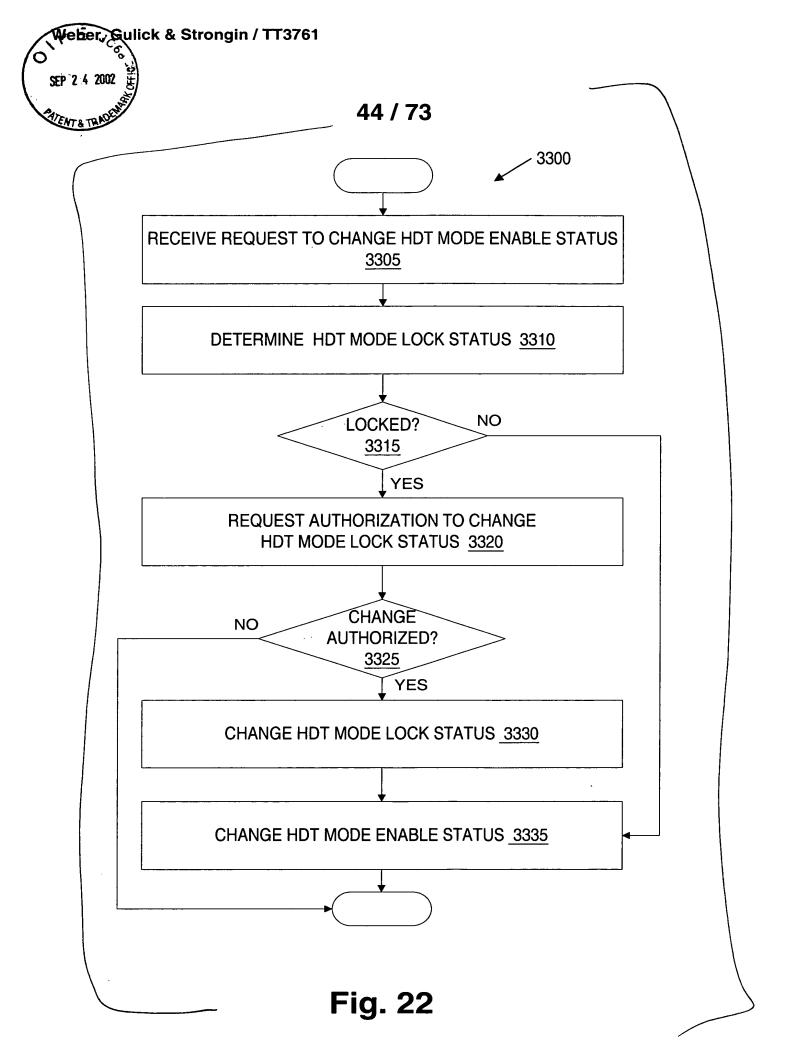


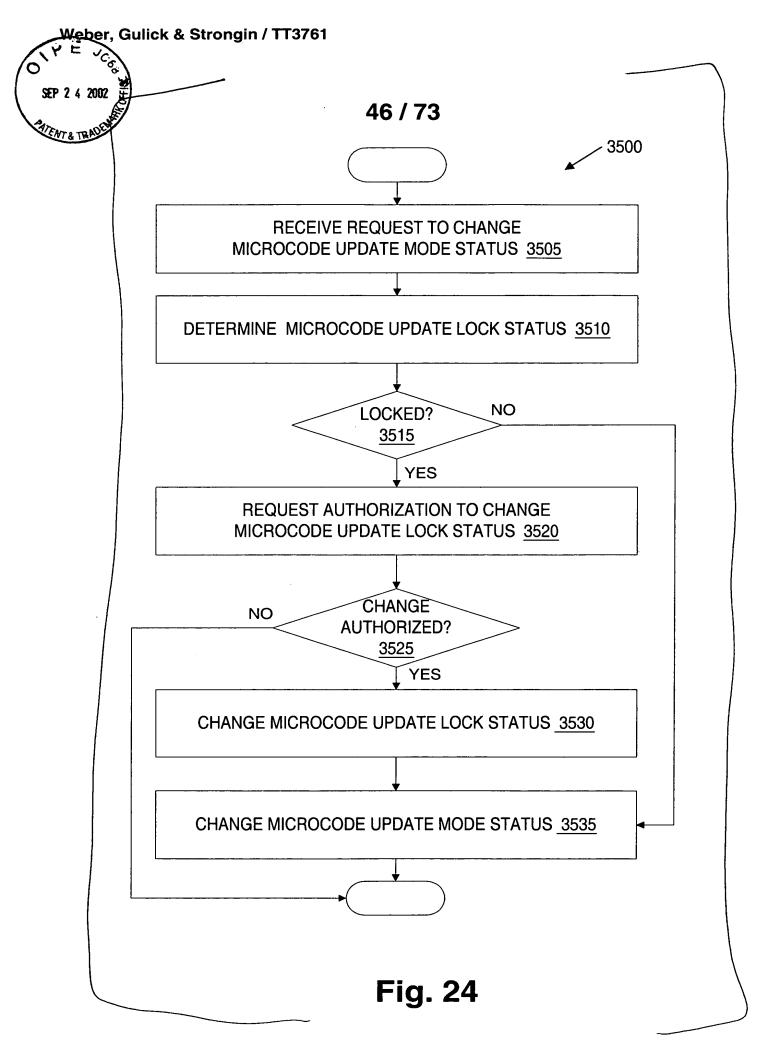














/1 3600A

A SECURITY DEVICE RECEIVES A TRANSACTION REQUEST FOR A STORAGE LOCATION ASSOCIATED WITH A STORAGE DEVICE CONNECTED TO THE SECURITY DEVICE 3605A

THE SECURITY DEVICE PROVIDES ACCESS CONTROL FOR THE STORAGE DEVICE 3610A

THE SECURITY DEVICE MAPS THE STORAGE LOCATION IN THE TRANSACTION REQUEST ACCORDING TO THE ADDRESS MAPPING OF THE STORAGE DEVICE 3615A

THE SECURITY DEVICE PROVIDES THE TRANSACTION REQUEST TO THE STORAGE DEVICE 3620A

THE STORAGE DEVICE PERFORMS THE REQUESTED TRANSACTION 3625A

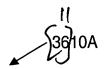
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11 A CRYPTO-PROCESSOR RECEIVES A TRANSACTION REQUEST FOR A MEMORY LOCATION ASSOCIATED WITH A MEMORY CONNECTED TO THE CRYPTO-PROCESSOR 3605B THE CRYPTO-PROCESSOR PROVIDES ACCESS CONTROL FOR THE MEMORY 3610B THE CRYPTO-PROCESSOR MAPS THE MEMORY LOCATION IN THE TRANSACTION REQUEST ACCORDING TO THE ADDRESS MAPPING OF THE MEMORY 3615B THE CRYPTO-PROCESSOR PROVIDES THE TRANSACTION REQUEST TO THE MEMORY (3620B THE MEMORY PERFORMS THE REQUESTED TRANSACTION (3625B







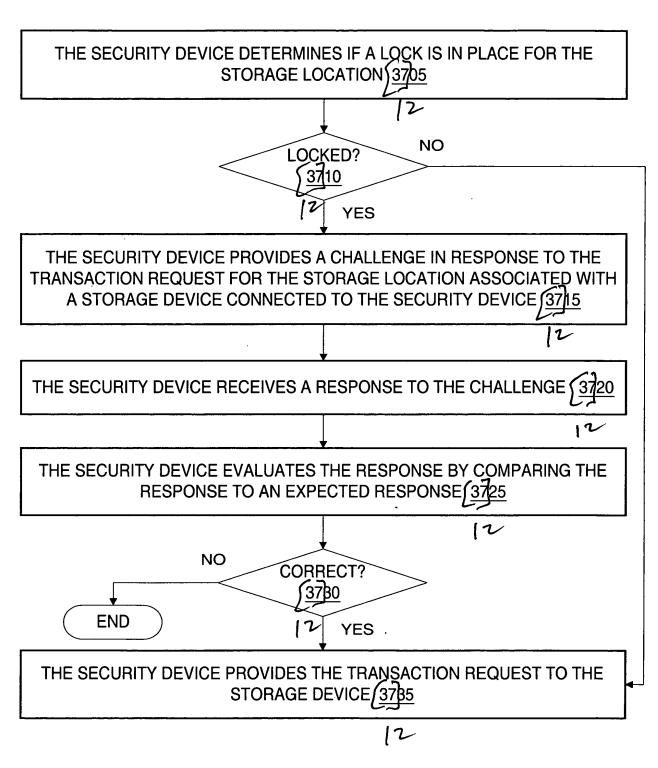
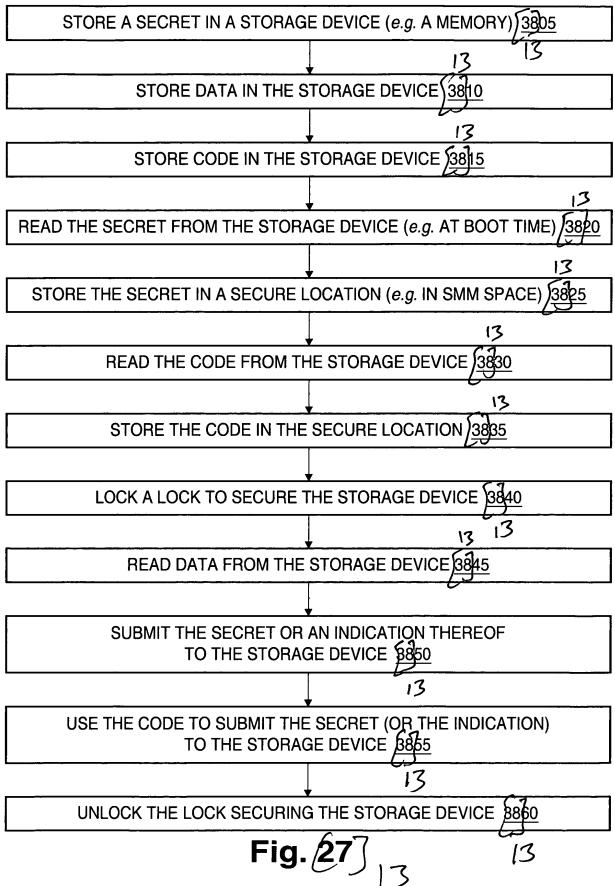
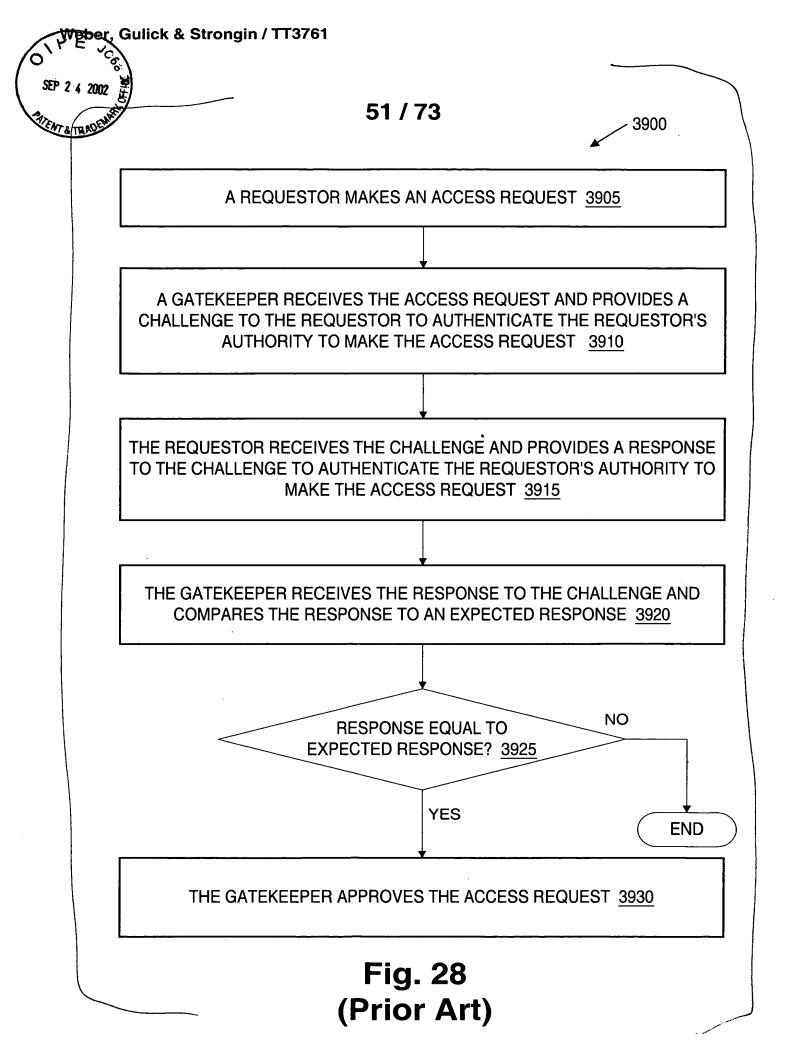


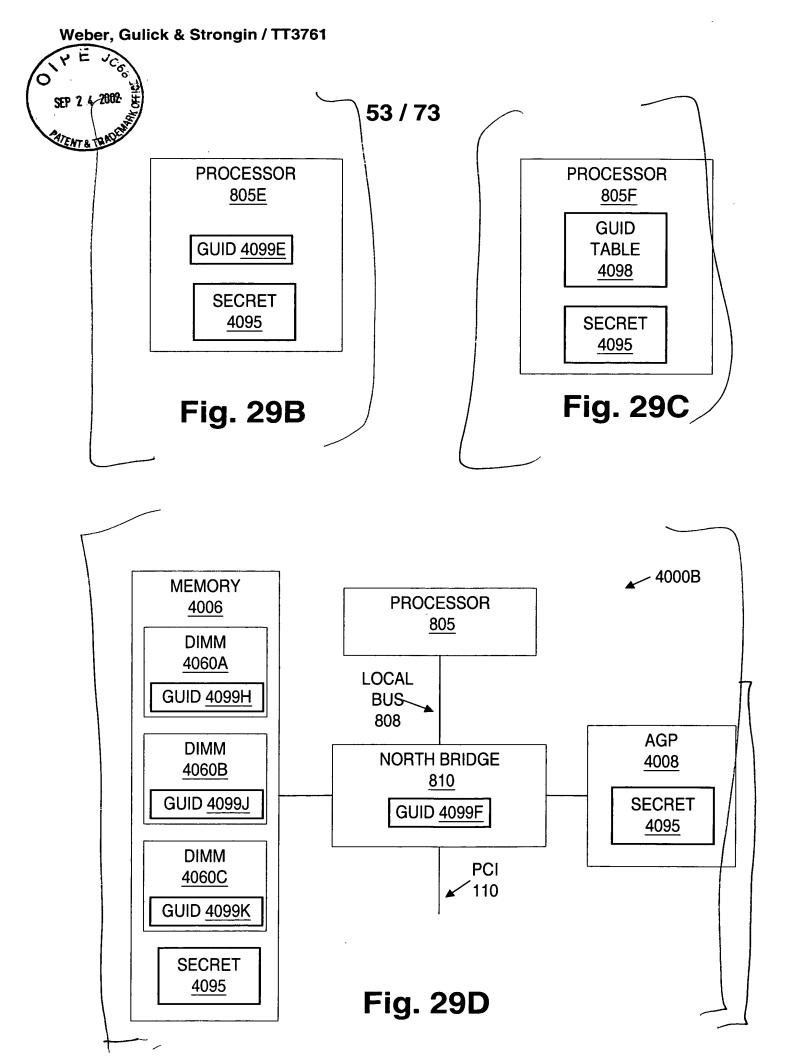
Fig. 26] 12

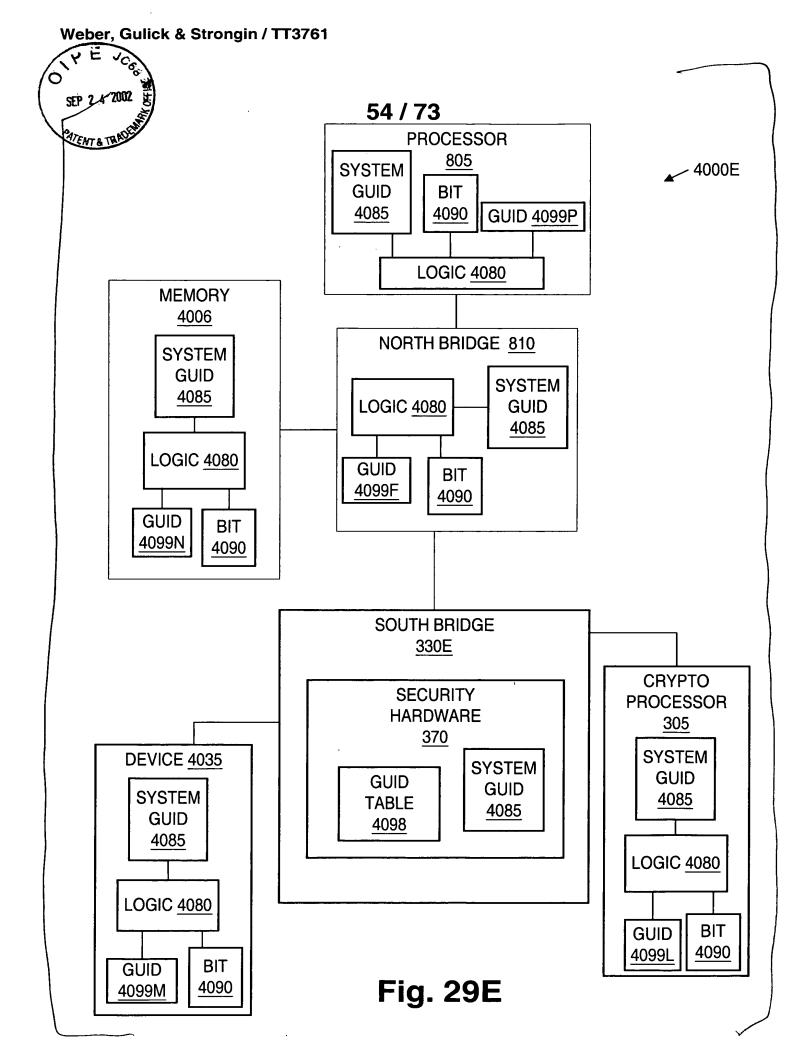












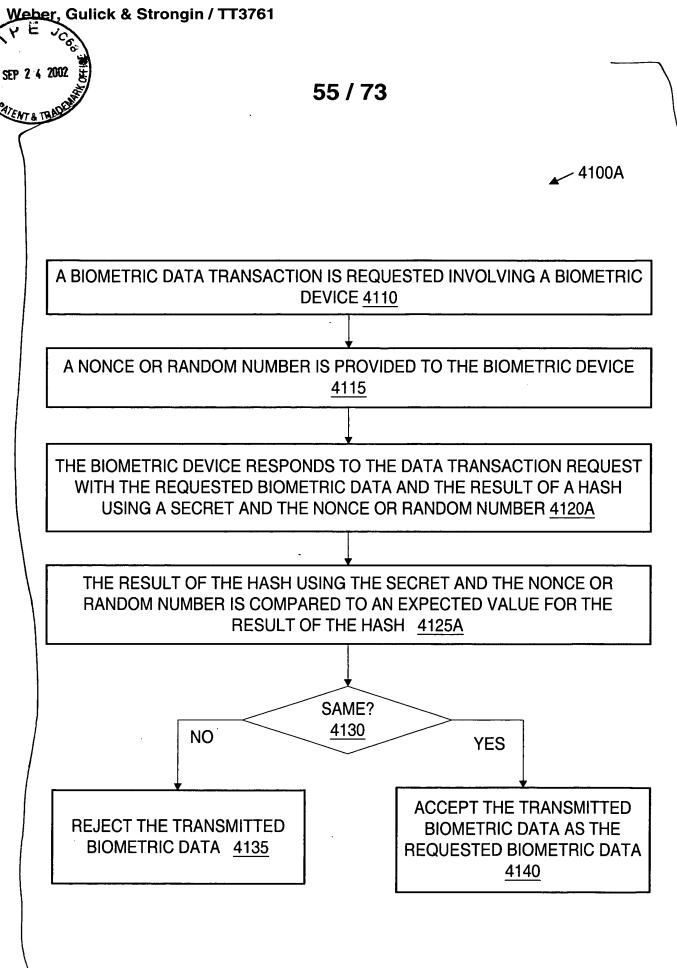


Fig. 30A



- 4200A

A MASTER DEVICE IN THE COMPUTER SYSTEM ESTABLISHES A SECRET WITH A DEVICE IN THE COMPUTER SYSTEM DURING A TRUSTED SET-UP 4205

A DATA TRANSACTION IS REQUESTED INVOLVING THE DEVICE IN THE COMPUTER SYSTEM THAT KNOWS THE SECRET 4210

A NONCE OR RANDOM NUMBER IS PROVIDED TO THE DEVICE IN THE COMPUTER SYSTEM THAT KNOWS THE SECRET 4215

THE DEVICE RESPONDS TO THE DATA TRANSACTION REQUEST WITH EITHER THE REQUESTED DATA AND A RESULT OF A HASH USING THE SECRET AND THE NONCE OR RANDOM NUMBER OR THE RESULT OF THE HASH 4220A

THE RESULT OF THE HASH USING THE SECRET AND THE NONCE OR RANDOM NUMBER IS COMPARED TO AN EXPECTED VALUE FOR THE RESULT OF THE HASH 4225

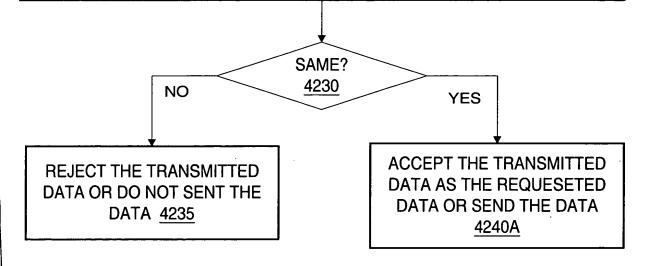


Fig. 31A

4200B

A MASTER DEVICE IN THE COMPUTER SYSTEM ESTABLISHES A SECRET WITH A DEVICE IN THE COMPUTER SYSTEM DURING A TRUSTED SET-UP 4205

A DATA TRANSACTION IS REQUESTED INVOLVING THE DEVICE IN THE COMPUTER SYSTEM THAT KNOWS THE SECRET 4210

A NONCE OR RANDOM NUMBER IS PROVIDED TO THE DEVICE IN THE COMPUTER SYSTEM THAT KNOWS THE SECRET 4215

THE DEVICE RESPONDS TO THE DATA TRANSACTION REQUEST BY EITHER ENCRYPTING THE REQUESTED DATA USING THE SECRET AND THE NONCE OR RANDOM NUMBER AND TRANSMITTING THE ENCRYPTED DATA AND A RESULT OF A HASH USING THE SECRET AND THE NONCE OR RANDOM NUMBER OR TRANSMITTING THE RESULT OF THE HASH 4220B

THE RESULT OF THE HASH USING THE SECRET AND THE NONCE OR RANDOM NUMBER IS COMPARED TO AN EXPECTED VALUE FOR THE RESULT OF THE HASH 4225

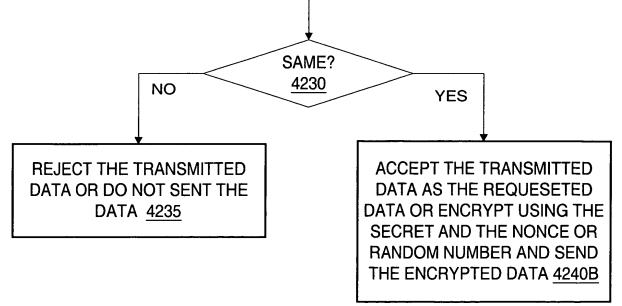


Fig. 31B

4300A

A MASTER DEVICE IN THE COMPUTER SYSTEM READS THE GUID FOR A DEVICE IN THE COMPUTER SYSTEM AND RECORDS THE GUID IN A GUID TABLE DURING A TRUSTED SET-UP 4305

A DATA TRANSACTION IS REQUESTED INVOLVING THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID 4310

A NONCE OR RANDOM NUMBER IS PROVIDED TO THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID 4315

THE DEVICE RESPONDS TO THE DATA TRANSACTION REQUEST WITH THE REQUESTED DATA AND A RESULT OF A HASH USING THE GUID AND THE NONCE OR RANDOM NUMBER OR THE RESULT OF THE HASH 4320A

THE RESULT OF THE HASH USING THE GUID AND THE NONCE OR RANDOM NUMBER IS COMPARED TO AN EXPECTED VALUE FOR THE RESULT OF THE HASH 4325

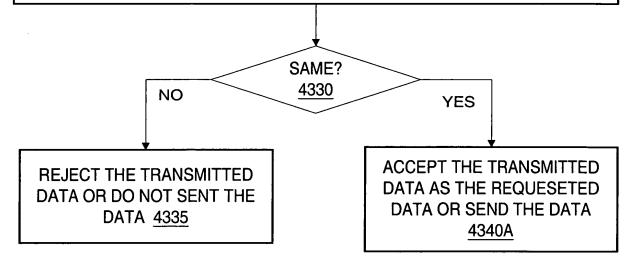


Fig. 32A



__ 4300B

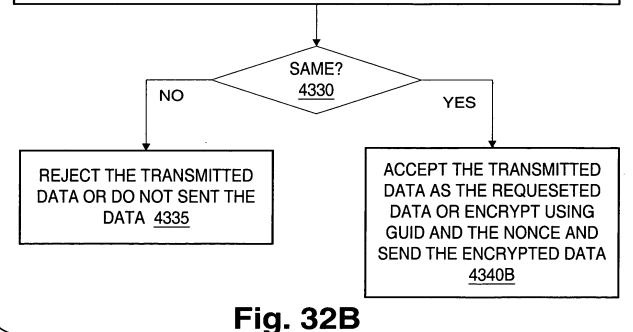
A MASTER DEVICE IN THE COMPUTER SYSTEM READS THE GUID FOR A DEVICE IN THE COMPUTER SYSTEM AND RECORDS THE GUID IN A GUID TABLE DURING A TRUSTED SET-UP 4305

A DATA TRANSACTION IS REQUESTED INVOLVING THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID 4310

A NONCE OR RANDOM NUMBER IS PROVIDED TO THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID 4315

THE DEVICE RESPONDS TO THE DATA TRANSACTION REQUEST BY ENCRYPTING THE REQUESTED DATA USING THE GUID AND THE NONCE OR RANDOM NUMBER AND TRANSMITTING THE ENCRYPTED DATA AND A RESULT OF A HASH USING THE GUID AND THE NONCE OR RANDOM NUMBER OR TRANSMITTING THE RESULT OF THE HASH 4320B

THE RESULT OF THE HASH USING THE GUID AND THE NONCE OR RANDOM NUMBER IS COMPARED TO AN EXPECTED VALUE FOR THE RESULT OF THE HASH 4325





→ 4300C

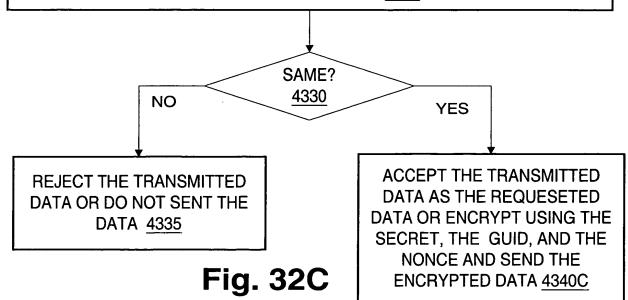
A MASTER DEVICE IN THE COMPUTER SYSTEM READS THE GUID FOR A DEVICE IN THE COMPUTER SYSTEM, RECORDS THE GUID IN A GUID TABLE, AND TRANSMITS A SECRET TO THE DEVICE DURING A TRUSTED SET-UP 4306

A DATA TRANSACTION IS REQUESTED INVOLVING THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID THAT KNOWS THE SECRET 4311

A NONCE OR RANDOM NUMBER IS PROVIDED TO THE DEVICE IN THE COMPUTER SYSTEM WITH THE KNOWN GUID THAT KNOWS THE SECRET $\underline{4316}$

THE DEVICE RESPONDS TO THE DATA TRANSACTION REQUEST BY ENCRYPTING THE REQUESTED DATA USING THE SECRET, THE GUID, AND THE NONCE OR RANDOM NUMBER AND TRANSMITTING THE ENCRYPTED DATA AND A RESULT OF A HASH USING THE SECRET, THE GUID, AND THE NONCE OR RANDOM NUMBER OR TRANSMITTING THE RESULT OF THE HASH 4320C

THE RESULT OF THE HASH USING THE SECRET, THE GUID, AND THE NONCE OR RANDOM NUMBER IS COMPARED TO AN EXPECTED VALUE FOR THE RESULT OF THE HASH 4326





4500

THE DEVICE OR THE MASTER DEVICE INITIATES A REQUEST FOR THE DEVICE TO LEAVE THE COMPUTER SYSTEM 4505

THE DEVICE AND THE MASTER DEVICE AUTHENTICATE EACH OTHER USING THE GUID AND/OR THE SYSTEM GUID IN RESPONSE TO THE REQUEST FOR THE DEVICE TO LEAVE THE COMPUTER SYSTEM 4510

THE DEVICE RESETS THE INTRODUCED BIT IN RESPONSE TO THE DEVICE AND THE MASTER DEVICE SUCCESSFULLY AUTHENTICATING EACH OTHER 4515

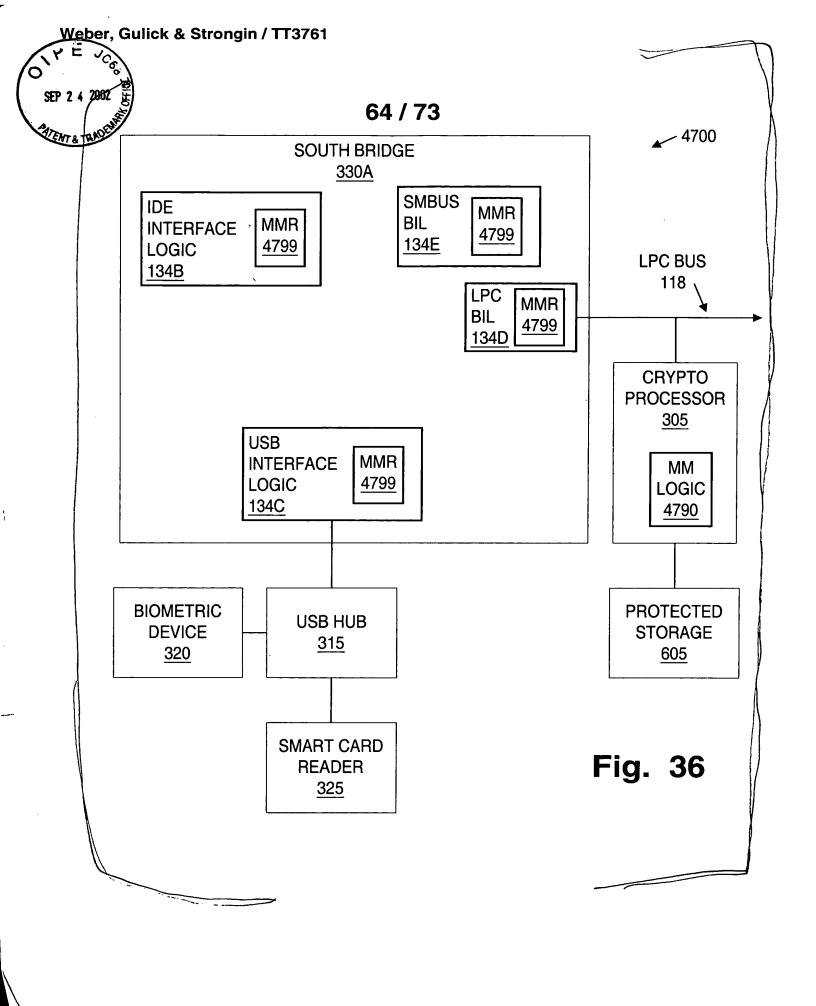
Fig. 34

4600

THE DEVICE RECEIVING A COMMAND FOR THE DEVICE TO LEAVE THE COMPUTER SYSTEM 4605

THE DEVICE RECEIVING A MAINTENANCE KEY THAT SUCCESSFULLY AUTHENTICATES 4610

THE DEVICE RESETS THE INTRODUCED BIT IN RESPONSE TO THE DEVICE RECEIVING THE MAINTENANCE KEY THAT SUCCESSFULLY AUTHENTICATES 4615





4800

TRANSMIT A MASTER MODE SIGNAL TO BUS INTERFACE LOGIC CONNECTED BETWEEN MASTER MODE LOGIC AND A DATA INPUT DEVICE, WHERE THE BUS INTERFACE LOGIC INCLUDES A MASTER MODE REGISTER 4805

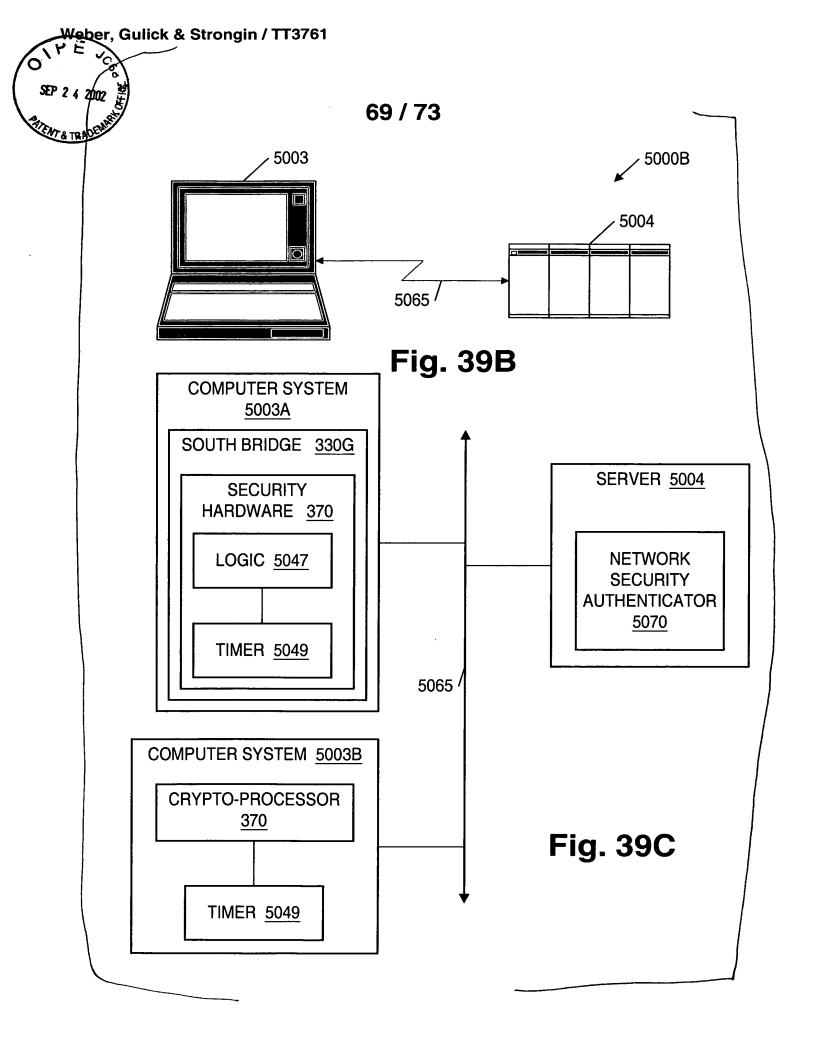
SET A MASTER MODE BIT IN THE MASTER MODE REGISTER(S) TO ESTABLISH SECURE TRANSMISSION CHANNEL BETWEEN THE MASTER MODE LOGIC AND THE DATA INPUT DEVICE OUTSIDE THE OPERATING SYSTEM OF THE COMPUTER SYSTEM 4810

THE MASTER MODE LOGIC AND THE DATA INPUT DEVICE EXCHANGE DATA OUTSIDE THE OPERATING SYSTEM OF THE COMPUTER SYSTEM THROUGH THE BUS INTERFACE LOGIC(S) THAT INCLUDE THE MASTER MODE REGISTER 4815

THE MASTER MODE LOGIC FLUSHES THE BUFFERS OF THE BUS INTERFACE LOGIC(S) THAT INCLUDE THE MASTER MODE REGISTER AFTER CONCLUDING THE DATA TRANSMISSIONS 4820

THE MASTER MODE LOGIC SIGNALS THE BUS INTERFACE LOGIC(S) TO UNSET THE MASER MODE BITS AFTER FLUSHING THE BUFFERS OF THE BUS INTERFACE LOGIC(S) THAT INCLUDE THE MASTER MODE REGISTER 4825

Fig. 37



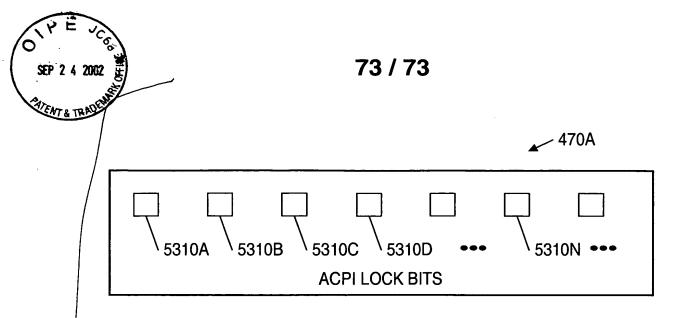


Fig. 42A

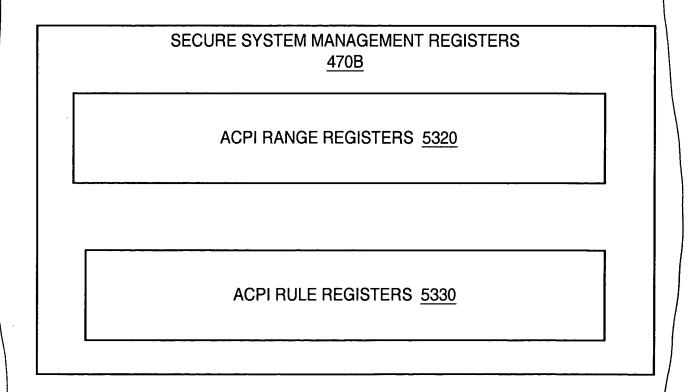


Fig. 42B